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ABSTRACT

A study was conducted to identify characteristics of student writers that might be used to predict which of two invention procedures--free writing or the tagmemic heuristic procedure--would be more effective in improving writing skills. A secondary purpose was to investigate whether writing improvement correlated with a lessening in anxiety. Three student characteristics were identified: conceptual level, IQ, and educational preference (aspiration). The subjects were 93 tenth grade students in four sections, all taught by the same teacher, who was also the researcher. Throughout 20 weeks of instruction, the writing problems assigned and the data given were the same for all sections, but two sections were instructed in the tagmemic heuristic approach and two were instructed in free writing. Anxiety and attitude, conceptual level and IQ, and writing skills were assessed before, during, and after treatment. Results indicated that (1) the groups that studied tagmemic heuristics showed a trend toward writing improvement: (2) tagmemic heuristics were significantly more useful than free writing in increasing the number and variety of ideas in expository essays for college-bound students and for students with low conceptual level and with middle ability: and (3) after instruction in tagmemic heuristics, anxiety tended to decrease in low conceptual level and middle IQ groups and to increase in college-bound students. (GT)

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SYSTEMATIC OR UNSYSTEMATIC INVENTION INSTRUCTION: WHICH IS MORE EFFECTIVE FOR A STUDENT WRITER?

Nancyanne Rabianski

During the past fifteen years, composition teachers and researchers have become increasingly interested in the teaching of invention, the classical art of discovering, ordering, and interrelating ideas. This interest has generated a variety of heuristic procedures to aid in invention. These procedures have presented composition teachers with potential aid for students, but the procedures have also presented teachers with a potential problem. As Richard Young has cautioned, the teacher must now judge the various procedures and select the most effective one(s) (Young, 1978, p. 39).

Of the various procedures, there are two procedures in particular that invite comparison because they both appear to be potentially effective, yet they differ distinctly in structure. One procedure is the tagmemic heuristic procedure developed by Richard Young, Alton Becker, and Kenneth Pike (1970); the other is a free writing procedure developed by Peter Elbow (1973). The tagmemic heuristic procedure provides a student writer with a systematic approach to a writing task. Before beginning a draft, the writer must design and answer relevant questions based upon a set of probes. In contrast, Elbow's free writing procedure requires the writer to approach a writing task

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in a relatively unsystematic way by continuously writing whatever relevant ideas and/or digressions are brought to mind by the topic.

Despite this basic difference in the structure of the two procedures, both do appear to be potentially effective. The tagmemic heuristic procedure, according to W. Ross Winterowd, is the most potentially useful of the new systematic procedures (Winterowd, 1976, p. 319). This opinion is supported by published studies conducted by Richard Young (1973) and by Lee Odell (1970) in which the tagmemic heuristic procedure has been proven to be effective in improving posttest essays written by a significant number of student writers. The free writing procedure, as described by Peter Elbow, has also received enthusiastic support. James Kinney has stated that "the simplest, most effective and most readily available of all intuitive heuristics is free writing, particularly as described by Peter Elbow in Writing Without Teachers. . . ." (Kinney, 1979, p. 355). However, there have been no published research studies to confirm the effectiveness of free writing.

Since the body of invention research has focused upon the effectiveness of the tagmemic heuristic procedure in aiding significant numbers of student writers, there are two unknowns that need to be investigated before a classroom teacher can select between free writing and the tagmemic heuristic procedure. First, it is not clear which, if either, of the two procedures is more effective. Secondly, the previous studies of Young and of Odell have proven the tagmemic heuristic procedure to be effective for a significant number of students, but the research did not make clear which type of student was effectively helped and which was not. In order for a classroom teacher to use research as a guide in selecting either the tagmemic heuristic procedure or free writing as a procedure to aid a student who is experiencing difficulty with invention, research must identify not only the more

effective procedure, but also the type of student writer for whom it is effective.

PURPOSE: Since there are two different heuristic procedures that both appear to be promising and very little relevant research to use in deciding between them, a teacher of composition is left with the question: Which invention procedure would be more effective for a student experiencing difficulties with the process of invention? The main purpose of the research to be described was to investigate this specific question by identifying, through quantifiable research, some of the characteristics of a student writer that might be used to predict which particular heuristic procedure, either Elbow's free writing procedure or the tagmemic heuristic procedure, would be more effective in improving a student's ability to discover and interrelate ideas in writing essays with an informative aim. A secondary purpose of the study grew from the study's main purpose of measuring achievement in writing skill. Previous research has indicated an evident relationship between a writer's achievement and a writer's attitude (Denman, 1978; Cope, 1978; Daly, 1978; Book, 1976; and Powers and Meyer, 1979). Consequently, the second purpose of the study was to investigate whether or not those students who were found to experience a pre-post test improvement in writing also experienced a pre-post test lessening in anxiety, as measured by the Daly-Miller Writing Apprehension Scale.

DESIGN OF THE STUDY: In order to fulfill the main purpose of the study, it was necessary to identify independent variables that might prove to be significant in differentiating between student writers in the sample. The variables identified were: 1.) Treatment, 2.) Conceptual Level, 3.) I.Q., and 4.) Educational Preference. First, the most readily apparent difference between student writers was caused by the separate treatments assigned to them. Students who studied the tagmemic heuristic procedure received more

structured instruction than students who studied Elbow's free writing procedure. Secondly, previous studies have indicated a relationship between degree of structure in a learning situation and the particular thinking style of the learner. Some people prefer structured learning situations; others do not (Cronbach and Snow, 1976, p. 375). The second variable, Conceptual Level, is based upon a model developed by David Hunt to conceptualize the preference for structure/lack of structure in learning. General ability, as indicated by I.Q., was a third variable that distinguished the students from one another. Finally, the fourth variable identified was the educational preference of a student. In the sample school, instructional groups were normally formed on the basis of a student's vocational or college-bound plans after graduation. From these groups, one college-bound and one vocational class were randomly assigned to the tagmemic heuristic treatment and one college-bound and one vocational class were randomly assigned to the free writing treatment.

Each of the four variables were expressed in multiple levels. There were two treatment levels (the tagmemic heuristic procedure and the free writing procedure), three Conceptual Levels (high, from 2.0-3.0; medium, from 1.21-1.99; and low, from 0-1.2 on Hunt's Paragraph Completion Test), two I.Q. levels (medium, from 85-115 and high, from 116-135), and two Educational Preference Groups (college-bound and vocational students). This is a 2x3x2x2 nested design; that is, a factor with two levels has been nested within one factor with three levels and two factors with two levels each. A nested design was necessary in order to test the main question of which heuristic procedure was more effective for a particular type of student writer. This question could not be answered by analyzing a main effect for

treatment because a main effect is simply an indication of whether free writing or the tagmemic heuristic procedure was the more effective treatment across all levels of the factors. Instead, it was necessary to compare the effect of each treatment on the performance of students within particular levels of each factor that were identified as distinguishing student writers within the sample, e.g., a comparison of low Conceptual Level writers who studied the tagmemic heuristic procedure with low Conceptual Level writers who studied free writing. Such comparisons were drawn first on the basis of essay data and then drawn on the basis of anxiety data.

In addition to the basic nested design, interviews were conducted with thirty-two students who had various combinations of extreme scores on I.Q., Conceptual Level, and anxiety measures. Interviewing is not an experimental research procedure, but the technique was useful interpreting the statistical results of the study.

SAMPLE AND INSTRUCTOR: The population consisted of five sections of tenth grade English students enrolled in a rural Upstate New York high school during the 1977-1978 fall semester. From the school's tenth grade population, a sample was drawn consisting of two sections of college-bound and two sections of vocational students (N=93). Assignment to each group, with the exception of the criteria of college/vocational plans, was made randomly. The teacher was also the researcher. Both the small size of the sample and the involvement of only one instructor have traditionally been considered to be serious limitations of a research study because they limit the generalizability of the experiment. On the other hand, these very restrictions provide some advantage in controlling internal validity, and to some extent, even external validity.

VALIDITY: If the teacher is the researcher, he/she can exercise particularly careful control over some features of experimentation that according to Campbell and Stanley affect validity (Campbell and Stanley, 1963, pp. 175-176). For example, testing in the study was very unobtrusive. The students in the sample unwittingly gave evidence of this. All students in the school that participated in the study are customarily interviewed by their guidance counselors at the end of each school year. During the interviews that were conducted following the study, each student who had participated in the study was asked by the counselor whether or not he/she had ever participated in educational research experimentation while in that school or elsewhere and whether or not he/she would be interested in doing so. All students stated that they had never been involved in a research study. Most seemed to think, as appeared to be the case at that time, that the guidance counselor would need to ask their permission before they could be subjects in a study. The testing evidently appeared to the students to be a normal part of their curriculum. In addition, since the researcher was the instructor, the curriculum remained consistent for all students with the exception of the differing treatments. Free reading days were a part of the weekly schedule so that if a class were cancelled, scheduled writing tasks could be written during a free reading day. There were also review sessions after school for students who missed more than a day of the week's instruction. Also, since there was only one teacher involved in the study, the interpretation of the two treatments was not affected by a teacher's inexperience in using a heuristic procedure, as occurred in a study conducted by Catherine Lamb (1974).

The small size of the sample was also in some ways an advantage. With a small number of students, it is possible, for example, to be certain that

the students in the sample have not previously been exposed to the treatment(s). Small groups are easier to monitor in a careful, thorough manner than are large groups. Furthermore, Kish has cautioned that with a large enough sample, even the most insignificant relationships might appear to be statistically significant (Thomas Hilgers, 1979, p. 279). Therefore, small scale, carefully controlled experiments are useful in producing significant findings that provide a sound basis for later, larger studies.

COURSES OF STUDY: The basic difference between the approaches of Young and of Elbow arises over the question of whether it is best to emphasize a systematic procedure such as free writing or an unsystematic procedure such as the tagmemic heuristic procedure. Throughout the twenty weeks of instruction that took place in the study, the writing problems assigned and the data given were the same for all students, but in keeping with the differing invention procedures, instruction differed in two distinctive ways. First, in the free writing groups, there was no explicit use of probes such as comparison/contrast (Odell's terminology). However, since such concepts are common ones, perhaps to be found in the thinking of all of us (Odell and Cooper, 1976), it was only natural that such concepts often appeared in student writing and occasionally were implied in an assignment or classroom discussion. In contrast, in the tagmemic heuristic classes, such concepts were emphasized. Students were taught to investigate them systematically and use them as much as possible in their writing. Secondly, there was a difference in the amount of teacher-direction found in the two groups. Elbow emphasizes the need for quick, frequent writing, which he views as the best way to prevent anxiety and coax intuition into operation (1973, p. 26). This type of writing is not so much a technique to be taught as it is simply a technique to be practiced so that the

writer becomes fluent at drafting continously without stopping to edit. In contrast, the tagmemic heuristic procedure must not only be practiced, but it must also be explained in detail. For example, during the weeks of instruction when students are being introduced to the various probes that are used to generate ideas, they often need the teacher's help in generating relevant questions based upon the probes. The systematic nature of this method makes it comparatively more teacher-directed than free writing, particularly during the initial stages of instruction.

Nature of the Writing Tasks: James Britton, in a study of British students ages eleven to eighteen determined that an informative aim (the aim of analogic writing) was most common in school sponsored tasks (Britton, 1975,pp. 173-174). Within the sample school in this study, writing with an informative aim was also a common task in English and social studies classes. Therefore, the writing tasks assigned during the course of instruction all had an informative aim. The study used two modes, reporting and generalizing, which were equivalent to reporting and analogic discourse, two of the types of discourse that James Britton closely associated with an informative aim. The basis for the assignments was James Moffett's series of assignments for the modes of reporting and generalizing that appear in A Student-Centered Language Arts Curriculum, Grades K-13: A Handbook for Teachers. Moffett's view of informative writing in terms of modes rather than aims is useful for two reasons. First, the increasing abstraction described may have resulted in an increasing need for some type of heuristic procedure. Moffett points out that as the distance and level of abstraction increases, so must the use of perception, memory, and reason (Teaching the Universe of Discourse, 1968, pp. 18-23). In dealing with the increasing difficulty of abstraction, therefore, the use of some form of a

heuristic procedure may have resulted in significant improvement. Secondly, since modes are categorized by form, they did not provide an explicit set of questions to act as a systematic heuristic procedure in guiding the writer. The heuristic nature of modes was, therefore, systematic, but not to such a degree that the use of modes would blur the distinction between the two types of procedures being investigated.

Moffett's modes served as a basis for the twenty week curriculum. However, only a portion of his sequence of assignments was used, and those assignments were supplemented with literature and films. Detailed daily lesson plans for both the tagmemic heuristic classes and the free writing classes are available so that the study could be accurately replicated (Rabianski, 1979, pp. 94-134).

DATA COLLECTION: Three types of data were gathered to measure the students' behavior before, during, and after treatment: affective measures of anxiety/attitude, cognitive measures of Conceptual Level and I.Q., and performance measures of writing skill.

Anxiety/Attitude Measures: Three measures were used to measure the student's attitude toward writing. One measure, the Writing Apprehension Scale by Daly and Miller was administered to each student once before instruction and once after instruction (Daly and Miller, 1975). The teacher did not handle these papers. Students were instructed that many jobs require varying degrees of writing, so the Guidance Department needed the information as a guide in helping them to select a future career. A second measure of attitude was the attitude checklist. This consisted of a dichotomous scale followed by an area for comments. The checklist was administered following a writing task at the midpoint and at the conclusion of instruction. Students were instructed that these checklists were not to be graded in any way. Students kept them in their individual writing files until the conclusion of instruction. The checklist

indicated what help, if any, the student received from the heuristic procedure. Sometimes this provided extra information not revealed on the Daly-Miller Scale; for example, a student who had honestly responded that in general he was not anxious about writing, nevertheless, indicated that some aspects of composition, such as the introduction to the paper, were troublesome. These checklists were also helpful in designing a list of questions to be asked of students when they were interviewed. Interviews, the third measure, allowed students to explain comments made on the checklists. The thirty-two students who were interviewed were randomly selected by a secretary from a list of students with extreme scores on the measures of Conceptual Level, I.Q., and anxiety. Various combinations of extremely high or low scores on these characteristics produced eight sets of students; for example, one set of students had high Conceptual Level, low I.Q., and low anxiety. The students within each set differed in terms of their educational preference group or their treatment. Students with a cross section of extreme scores were interviewed on the assumption that if the variables were significant, such students would be likely to have decided opinions about instruction. Students were led to believe that their interview comments would be used as an aid in revising any weak aspects of the sophomore composition program.

Cognitive Measures: There were two cognitive measures. First, in order to assess each student's Conceptual Level (his /her characteristic style of thinking), David Hunt's Paragraph Completion Test was administered. The test consisted of six unfinished statements about topics such as rules and parents. Students were asked to write at least three sentences in response to each incomplete statement. These responses provide a valid, reliable measure of the degree of structure that each student desired in a learning situation

(Bottenberg, 1969; Gardiner and Schrceder, 1972; and Hunt et al., 1977). However, the students assumed that the test was simply an English class exercise in which they were asked to write a brief opinion on a stated topic. The test was administered to all students during the week prior to writing instruction. Secondly, each student's general ability was assessed by the Otis-Lennon Test of Mental Abilities, a standardized test with an average I.Q. of 100 and a standard deviation of 15 points. The test had been administered by the Guidance Department in the year previous to the study.

Writing Skill Measures: The third type of data were performance measures of writing skill. In order to assess each student's pre-treatment writing ability, all students completed two writing tasks. According to Richard Lloyd-Jones, writing ability varies depending on the aim of the writing being done by a student (Lloyd-Jones, 1977, p. 37). Therefore, all pretests and posttests had a single aim. There were two types of writing collected, both of which had an informative aim. One type was generalization supported by instances. The other type was the case study, a type of writing which requires less abstraction than the generalization essay (Britton, 1975, Appendix- function categories). One case study and one generalization essay with instances were written as a pretest; parallel topics of these two types were written as a posttest. As suggested by the research of Sara Sanders and John Littlefield, the topics were always announced in advance. The topics assigned were:

Topic 1: a.) Adolescence is a difficult time. b.) Real friends are around when people need them. Choose whichever generalization you feel is true and explain by giving wide-ranging examples.

Topic 2: a.) Most teenagers are responsible people. b.) Money is an important element in most people's lives. Choose the generalization that you feel is true and explain by giving wide-ranging examples.

Topic 3: Two school-related jobs require special patience. One is driving a school bus and the other is monitoring the cafeteria. Watch either a bus driver or a cafeteria monitor and take some notes on the work that the person accomplishes. You will later explain what typically happens during a work day. Also, speak with the person so that you can indicate his/her attitude. Explain to the person that

this is a school assignment and his/her real name will not be used. If appearance pertains to the job, this may also be mentioned.

Topic 4: Observe a person closely on several occasions and then write a case study of that person. The pers n does not need to be a famous man or woman, but he/she should be someone that you personally admire. You should point out the distinctive, admirable qualities of the person so that he/she could be distinguished from other people. Give examples of the qualities based upon your observations. You may consider admirable aspects of the person such as behavior, attitude, or appearance.

For each task, students were instructed that the audience was an adult who was naive about the subject. The purpose was stated to be informative, rather than persuasive or expressive. Students were also instructed that they would be given two and one-half class sessions in which to complete each writing task, but as suggested by Sanders and Littlefield, they were assured that they would be given additional time when necessary (Sanders and Littlefield, 1975). Students were advised that the writings would not be graded; however, the teacher would read the papers and respond in an informal, personal manner to the content.

In addition to the student measures, data was also gathered on the difference in invention instruction in the various invention groups. An administrator, who was unaware of the nature of the study, observed the classes at two week intervals in order to report any differences in instruction. He verified that the only observable difference in instruction was indeed the the structured heuristic procedure used in one class and the unstructured heuristic procedure used in the other class.

DATA RATING: The Daly-Miller Scale was an objective measurement of anxiety; therefore, the pre and post test measures were simply rated by secretaries in the sample school's Guidance Department. A pretest score and a posttest score were recorded for each student. The pretest score was then subtracted from the posttest score to form an anxiety difference score.

The attitude measures, i.e., the checklists and interviews, were not evaluated until after all statistical analysis of the data had taken place. At

that time the teacher/researcher listened to the interviews conducted with the thirty-two students and closely examined the attitude checklists completed by those students in order to see if there were any generalizations that could be drawn from the comments that were made. In instances where a number of students did have similar attitudes toward the instructional procedures, these attitudes were recorded for use later in interpreting the statistical data and suggesting future research.

Rating of the Paragraph Completion Test: The Paragraph Completion Test was rated by the school psychologist and the teacher/researcher. The raters practiced with the samples that were included in David Hunt's rating guide and acheived a .88 inter-rater reliability. As was suggested by David Hunt, the raters rated the first thirty papers in the study as separate raters (Hunt, Oct., 1979) and achieved a .90 inter-rater reliability. The raters then scored the remainder of the papers together as a team. The top three scores for each student were then averaged to form a Conceptual Level score (1977, p. 37).

Rating of the Pre and Post Essay Tests: As preparation for rating the essays, a secretary typed the students' pre and post tests and replaced the students' names with identification numbers. Each student's pre and post test was also stapled together. The rating guide used in evaluating the essays began with a statement of the pre and post test essay topics.

Following the topics, the raters were given some criteria to use in making a holistic and then an analytic rating:

> 1. Relevance - any statement that gives information or elaborates on information that has already been given should be accorded credit 2. Non-Repetition - statements are not accorded credit more than once 3. Variety - a variety of statements should support the general thesis 4. Depth - statements should be elaborated in depth by giving a number of supporting examples or a lengthy narration.

The criteria of relevance, non-repetition, variety, and depth were prompted by

James Kinneavy in a discussion of the information given in referential discourse (1971, p. 93). The raters were cautioned to be consistent in using these criteria to rate each pair of essays first holistically and then analytically. For the holistic rating, the reader first read the paper, with the criteria in mind, and then assigned a score of 1-3. One meant a slight difference between the paired essays, two meant considerable difference, and three meant a great difference.

After completing the holistic rating of the paper, the rater made note of the number of generalizations and the number of elaborations of those generalizations found in the paper. Elaboration is, of course, not a fixed quantity that lends itself readily to the counting and allotting of points (Lloyd-Jones, 1978). However, information, by nature, is more quantitative than, for example, the emotions generated by expressive writing. Therefore, the researcher was able, after examining sample essays, to develop some equations that were based on the premise that three unelaborated generalizations were equivalent to one generalization with some elaboration in the form of one or two examples or specific generalizations. These equations were used to equate various types of elaboration, such as narratives and brief examples, and allot credit. As with the holistic rating, the final score was either a one, two, or a three. Raters were instructed not to change or even compare the holistic and analytic rating given to each paper. The rating guide Rabianski, 1979, pp. 154-178) was mailed to raters so that they could study the guide before the first training session. There were four raters, all of whom had had experience as high school English teachers before they became doctoral students. They also had previous experience as raters.

Rating of the papers was preceded by four training sessions of five hours each. At the training sessions, the raters first gave each sample paper a

quick holistic rating followed by an analytic rating that the raters discussed until they reached agreement. At the conclusion of the training sessions, each rater took home copies of the essays. The rating took place over the next two week period. Once during that period the group gathered together to discuss the papers that had been rated. This discussion was only for the purpose of calibration; ratings were not changed in instances where there was disagreement. Rater-reliability for the total of all topics scored analytically was .885. There was a .852 correlation between the holistic ratings and the analytic ratings. Since there was good analytic reliability and there was a positive relationship between the analytic and holistic ratings, the data from the holistic rating was not used for further analysis in the study.

STATISTICAL PROCEDURES: The numerical data was submitted to two way Analysis of Variance with statistical significance set at an *a priori* level of .05. Treatment was nested separately in Conceptual Level, I.Q. and Educational Preference. Weighted measures were used to compensate for differences in treatment group size within the factor levels. The data for hypothesis testing was provided by the outcome measures: 1.) a pre-post test essay difference score 2.) a pre-post test difference anxiety score. Analysis of these data resulted in a univariate F.

Since the raters did not know which essays were pretests and which were posttests, it was necessary for them to make two separate judgements. They indicated the degree of difference between the papers on a scale of *one* to *three* and then the better of the two papers. In order to develop one number that reflected both the better paper and the degree of difference, a scale was developed. If the rater selected the pretest as the better paper, a *great* difference was recorded as *1*, *considerable* difference as *2*, and a *slight* difference as *3*; If the posttest was the better paper, a *slight* difference was recorded as *4*, *considerable* difference as *5*, and a *great*

difference as 6. Since each student wrote two pairs of essays and there were four raters, eight scores were reported for each student. There was no significant variation between the difference scores students received on the generalization essays and the difference scores they received on the case studies, so the eight ratings were averaged to form a total pre-post difference score for each student. These scores were used in the following analysis of data for hypotheses testing.

RESULTS: Treatment Nested Within Conceptual Level

There were several predictions made about the effectiveness of treatment at various Conceptual Levels:

Hypothesis I: Students with low Conceptual Level who receive the tagmemic heuristic procedure will show more growth in writing performance than students with low Conceptual Level who receive the free writing procedure. (Significant)

Hypothesis II: Students with high Conceptual Level who receive the free writing treatment will show more growth in writing performance than students with high Conceptual Level who receive the tagmemic heuristic procedure. (Not Significant)

Hypothesis III: Unlike students with high or low Conceptual Levels, students with a middle Conceptual Level who receive instruction in the tagmemic heuristic procedure will not show a significant difference in growth performance from students with a middle Conceptual Level who receive instruction in the free writing procedure. (No evidence to suggest the contrary)

In order to test these hypotheses, treatment was nested within Conceptual Level, thereby forming six groups: 1.) low Conceptual Level x free writing 2.) low Conceptual Level x tagmemic heuristic procedure 3.) middle Conceptual Level x free writing 4.) middle Conceptual Level x tagmemic heuristic procedure 5.) high Conceptual Level x free writing 6.) high Conceptual Level x the tagmemic heuristic procedure. Comparisons were drawn between groups 1 and 2, 3 and 4, and 5 and 6. ($F_{3,87}$= 3.27) As indicated in Table 1, only those students who had a low Conceptual Level differed significantly on the basis of treatment. A significantly greater improvement was shown by low Conceptual Level students who studied the tagmemic heuristic procedure in comparison to those who studied free writing ($p. < .03$).

Treatment Nested Within I.Q.: The second set of hypotheses predicted the degree of writing growth that would be shown by students with a particular I.Q. level who received a specific instructional treatment:

Hypothesis IV: Students with low ability who receive the tagmemic heuristic treatment will show more growth in writing performance than students with low ability who receive free writing procedures. (Not Testable)

Hypothesis V: Unlike students with high or low ability, students with middle ability who receive the tagmemic heuristic procedure will not show significant difference in growth in writing performance from students with middle ability who receive instruction in the free writing procedures. (Not Significant)

Hypothesis VI: Students with high ability who receive the free writing treatment will show more growth in writing performance than students with high ability who receive the tagmemic heuristic procedure. (Not Significant)

In order to use the I.Q. data to test the hypotheses, treatment was nested within I.Q., which produced four groups: 1.) middle I.Q. x free writing 2.) middle I.Q. x tagmemic heuristic procedure 3.) high I.Q. x free writing 4.) high I.Q. x tagmemic heuristic procedure. Two comparisons were drawn, between groups 1 and 2 and between groups 3 and 4. ($F_{2,89}$= 4.39) Table 2 shows the direction of the difference and the probability.

The data resulted from the I.Q. scores on the Otis-Lennon Test of Mental Ability, whose S.D. is 15 points with a mean of 100. In this sample, there were no students whose scores were one standard deviation below the mean, so for the purposes of analysis, the students who ranged from 115-135 were categorized as the high I.Q. group. Since there was no low I.Q. group, Hypothesis IV was untestable. Hypothesis V was not supported since students with middle I.Q. showed significant writing improvement using the tagmemic treatment. Hypothesis VI was also not supported since students with a high I.Q. did not show significant improvement using free writing.

Treatment Nested in Ability Group: Students in this study were originally grouped in either college-bound or vocational classes on the basis of their plans after graduation. The two college-bound groups were comparable in size (N=27 and N=24), and the two vocational groups were comparable in size

(N=20 and N=22). The predictions were:

Hypothesis VII: The college-bound students who receive the free writing procedure will perform better than the college-bound students who receive the tagmemic heuristic procedure. (Not Significant)

Hypothesis VIII: The vocational students who receive the tagmemic heuristic procedure will perform better than the vocational students who receive the free writing procedure (Not Significant)

In order to test these hypotheses, treatment was nested within Educational Preference Group: 1.) free writing x college-bound 2.) free writing x vocational 3.) tagmemic procedure x college-bound 4.) tagmemic x vocational. Comparisons were drawn between groups 1 and 2 and between groups 3 and 4. ($F_{2,89}$= 5.33) As indicated in Table 3, Hypothesis VII was not supported because a comparison of college-bound students indicates that those who received the tagmemic heuristic, rather than the free writing treatment, showed significant writing improvement. Hypothesis VIII is also unsupported because there was no significant difference in the performance of college-bound students studying free writing and those studying the tagmemic heuristic procedure.

The Results of Hypothesis Testing With Anxiety Data: Anxiety was the second measured variable in this study. The anxiety data was provided by the students' pre-post test scores on the Daly-Miller Writing Apprehension Scale. The original pre-post test scores were subtracted to form a difference score, which was then used in hypothesis testing.

There was one main hypothesis that concerned anxiety. Students who do not feel that they write well often feel anxious about the prospect of writing and avoid writing whenever possible (Daly and Miller, 1975). It seemed likely, therefore that if writing performance improved, then writing anxiety would also ease:

Hypothesis IX: Students who experience a significant improvement in writing performance will also demonstrate a significant decrease in anxiety. (Not Significant)

The results of this hypothesis were not significant ($F_{3,87}$= .36; $p < .78$).

However, the lack of significance may have been caused to some extent by the small size of the sample. The table of means for each group that showed successful improvement in writing performance indicates a trend toward lessened writing anxiety also (See Tables 4-6). The low Conceptual Level group and the middle I.Q. group, each of which were significantly successful in exhibiting writing improvement, showed a trend toward lessened anxiety. The college-bound group that received the tagmemic heuristic treatment was the only group that showed significant writing improvement but a trend toward increased anxiety.

Conclusions: In general, the statistical results of this study indicate that for this sample of ninety-three tenth grade students the mean posttest was rated as 4, "slightly better", than the mean pretest. Within this sample, all groups that studied the tagmemic heuristic procedure showed a trend toward improved posttests (see Tables 1-3). In particular, the tagmemic heuristic procedure was significantly more useful than the free writing procedure in increasing the number and variety of ideas found in expository posttest essays for students with: 1.) low Conceptual Level (0-1.2), 2.) middle ability (I.Q. of 85-115), and 3.) college-bound students. These groups did not show a significant decrease in anxiety, but that may be due to the small numbers in the sample (see Tables 4-6). The trend in the low Conceptual Level and middle I.Q. groups was for anxiety to decrease after instruction in the tagmemic heuristic procedure. In the college-bound groups, students showed a trend toward increased anxiety after instruction in the tagmemic heuristic procedure.

DISCUSSION: The statistical results of this study were meant to offer a classroom teacher guidance in tentatively selecting either the tagmemic heuristic procedure or free writing as an aid for particular types of student writers. The student characteristics identified were: Conceptual Level, I.Q., and

Educational Preference Group. Of these three characteristics, Educational Preference is the least precise measure because it is a dichotomous factors rather than a measured variable. Consequently, in the following discussion, the statistical results of treatment nested in Conceptual Level and in I.Q. will be considered to be of primary importance in selecting the more effective heuristic procedure for a student writer. The suggestions for pairing students and a particular heuristic procedure will be based primarily upon the statistical results of Conceptual Level and of I.Q. hypothesis testing; however, students' interview comments will also be used to guide the discussion, especially in discussing students who possess characteristics for which there was not statistical significance.

Clearly few students in a random sample will possess all three characteristics of middle I.Q., low Conceptual Level, and college-bound preference. However, the support for selecting the tagmemic heuristic procedure rather than free writing is greatest when student's characteristics closely approximate those found to be significant. In particular, there is strong statistical support if a student has a middle I.Q. and a low Conceptual Level. There is also strong interview support. For example, the tagmemic heuristic procedure seemed to be the better procedure for two students who were interviewed that possessed clearly middle I.Q. levels and low-middle Conceptual Level scores even though neither was in a college-bound group. One of the girls, who had a low Conceptual Level of 1.17 and a middle I.Q. of 90, felt that the tagmemic heuristic procedure helped her to gather and organize ideas. She had previously been taught to outline before drafting, but she had always found it impossible to outline when she had no ideas. She also commented that since she had been using the probes her writing had improved so much that she felt encouraged to spend time proofreading her work. She indicated that she felt more proud of her work and less anxious. Another girl, who had a middle I.Q. of 97 and a

low-mid Conceptual Level score of 1.33, studied free writing, but made interview comments that indicated her desire for a systematic heuristic procedure. She indicated that she did complete the free writes that were assigned, but she admitted that she always secretly outlined at home before writing an essay in school. She felt that the outlines were really the form of pre-writing that aided her; the "extra stuff" in the free writes just confused her. The girl never accepted the relatively unsystematic procedure of free writing. The two student writers just discussed share similar I.Q. and Conceptual Level scores, and they also seem to share the desire for a systematic type of heuristic procedure.

In addition to students who closely approximate the statistically significant characteristics of middle I.Q. and low Conceptual Level, there will be many students in a random sample who possess extreme variations in scores, such as a high I.Q. but a low Conceptual Level. A student of this sort would be likely to respond well to the tagmemic heuristic procedure because of his/her statistically significant characteristic of low Conceptual Level. However, students of this sort who were interviewed, unlike the students previously discussed, seemed to feel an ambivalence toward the tagmemic heuristic procedure, particularly at the outset of instruction. This feeling was expressed in the attitude checklists collected after an early writing assignment. Their initial ambivalence is understandable since the writing of a student with, for example, a low Conceptual Level would be expected, according to the results of the study, to improve after instruction in the tagmemic heuristic procedure; on the other hand, the writing of a student with a high I.Q. would not necessarily be expected to improve after studying the tagmemic heuristic procedure. The students' mixed emotions may be simply a reflection of their mixture of characteristics. As the semester progressed, such students gradually became more com-

fortable in using the tagmemic probes. However, at the conclusion of instruction, some students still felt that they needed more time to practice with the probes in order to become truly proficient in using them. Perhaps students who have a wide variance in levels of scores on the variable of Conceptual Level and I.Q. simply need a longer period of time to adjust to using the tagmemic heuristic procedure than do students whose characteristics more closely approximate a middle level I.Q. and a low Conceptual Level.

A random sample would also contain students who possess neither of the primary features that were associated with a statistically significant gain in writing growth. These students would possess a high I.Q. and a high Conceptual Level or a high I.Q. and a middle Conceptual Level. Although for such students the statistical results of the study indicated no significant difference in the effects of the tagmemic heuristic procedure and of free writing, interviews with students who possessed these characteristics indicated that perhaps they should be taught to free write since, as was predicted originally, the procedure seems best suited to the natural writing style of such students. For example, one boy with a high I.Q. (127) and a middle Conceptual Level (1.83) who studied the tagmemic heuristic procedure felt that he should not use the tagmemic probes. He pointed out that before instruction began, there was already evidence in his writing of the types of ideas that the probes can generate. The boy was accustomed to doing expressive writing in his leisure time. His normal method of writing was simply to write and then rewrite when necessary. He felt that the probes simply slowed him down and prevented him from writing. He stated adamantly that he would not continue to use the tagmemic heuristic procedure after the conclusion of instruction. He found the procedure to be frustrating rather than helpful.

The boy was a member of a college-bound class. One of his comments suggests a reason that the tagmemic heuristic procedure was more helpful than the free

writing procedure for a significant number of students in the college-bound groups. He indicated that since the aim of the writing was to give information the discussion of the probes was helpful to some of his classmates because they felt that they knew what types of ideas the teacher-audience expected to find in the essays. Other students in the class confirmed his statement. He did not, however, feel that the probes would have aided them as much in expressive writing.

The frustration exhibited by some students who were paired adversely with a heuristic procedure during the course of the study provides good reason for trying to match students with a suitable procedure rather than simply teaching one procedure or both to an entire class. The lengthy period that is necessary in order to practice and become proficient at using a heuristic procedure can be very frustrating for a student who feels that the procedure does not meet his/her needs or preferences. The result of the repeated use of such a procedure could block a student's flow of ideas rather than aid it.

IMPLICATIONS FOR RESEARCH: There were three sources for research implications: interviews with students, findings of other researchers, and limitations of this study. Several research questions were prompted by student interviews:

1.) What are the most efficient ways to use heuristic procedures?

All students interviewed felt that the usefulness of the procedures was related to the topic requirements. In the tagmemic group, one student indicated that not only are some of the probes irrelevant to the topic, but also some are so closely related that it wastes time to respond to the probes separately. He said, for example, physical context might be the cause of someone's behavior, such as a party causing someone to behave in a rowdy manner. In the free writing group, students felt that if the topic was unfamiliar, then they needed to free write, or if the audience's viewpoint was very different from their own, then they needed to press for Elbow's detailed pointing and telling feedback.

2.) Are the free writing procedure and the tagmemic heuristic procedure equally useful for different aims? In this study of writing with an informative aim, the tagmemic heuristic procedure was significantly helpful for particular groups of students. Would free writing be significantly helpful for a different aim? Students in the free writing groups made comments that indicated that this might be the case, particularly with personal writing that has an expressive aim.

3.) Does student preference for a particular writing aim affect the test results? One student commented that he was glad that the class did only informational writing during the semester since this was the only kind of writing that he liked to do. If this study were repeated, but data was collected on student aim preference, would there be an interaction between writing achievement and aim preference?

Other research questions were prompted by the findings of other researchers:

4.) Do students who use these heuristic procedures intuitively still benefit from conscious instruction in the use of the procedures? Odell and Cooper (1976) have found evidence of the intuitive use of the tagmemic probes in the writing of college freshmen and professional authors. It is not clear, however, if the use of these probes could be further improved through instruction.

5.) What are the variety of ways in which the heuristic procedures are useful? In this study the essays were tested for improvement in invention. According to classical rhetoricians, invention (inventio) is the gathering of arguments (ideas); dispositio is the selecting, arranging, and apportioning of ideas. Mark Knapp and James McCroskey, however, have maintained that these are not separate functions (1966, pp. 17-18,44). In addition, Richard Young has indicated a possible relation between invention and style (1976, p. 34).

6.) Is the writing process hastened by the use of an invention procedure? Richard Young has indicated, but has not provided the evidence to prove,

that the use of either a systematic or unsystematic heuristic procedure reduces the number of trials necessary for a writer to achieve satisfaction (1976, p. 34).

7.) What would be the comparative effects of other approaches to writing? Brena Bain Walker in her dissertation described some interesting, though less extreme, writing approaches in addition to the ones used in this study. These approaches might be used for comparisons. For example, the environment-stimulus approach of Robert Zoellner might be compared to the tagmemic heuristic approach (Walker, 1974, p. 165).

There were also further studies suggested by the limitations of this study:

8.) Would the heuristic procedures be useful in aiding students with the difficulties generated by a distant audience and a speaker other than the writer? The tagmemic heuristic procedure and the free writing procedure have the potential to aid writers with the difficulties generated by the speaker-audience aspects of writing, but the pretests and posttests in this study did not provide for a distant audience or speaker.

9.) Will the results of instruction have a lasting effect on student writing performance and anxiety? The students in this study completed a delayed posttest three months after the completion of instruction. The data was not analyzed because of the expense involved. Such data might reveal the long range effects, if any, of instruction.

10.) Are the results of testing found in this study the same with a variety of students, teachers and curriculums? It is not clear if the results of this study would be the same if the curriculum were not based upon Moffett's series of assignments. It is also unclear if the results would be the same with a variety of teachers with differing personalities and teaching techniques and a variety of students of differing ages and backgrounds. In the future this study needs to be replicated to be certain the results are truly generalizable.

TABLE I

Cell Means for Writing Performance and Probability of Significant Differences

CONCEPTUAL LEVEL

TREATMENT		Low	Medium	High
	Free Writing	32.83 N=12	30.55 N=22	29.73 N=15
	Tagmemics	41.67 N=9	33.92 N=24	35.91 N=11
	Probability	$<.03$	$<.20$	$<.08$
	Significance	yes	no	no

NOTE: Mean essay scores reported above were based upon the difference between the two pretest and two posttest essay scores reported by four raters.

TABLE 2

Cell Means for Writing Performance and Probability of Significance

		I.Q. Middle	I.Q. High
TREATMENT	Free Writing	26.69 N=36	34.08 N=13
	Tagmemics	35.91 N=34	36.30 N=10
	Probability	$< .01$	$< .56$
	Significance	yes	no

TABLE 3

Cell Means for Writing Performance and Probability

EDUCATIONAL PREFERENCE GROUP

TREATMENT		College-bound	Vocational
	Free Writing	31.67 N=27	29.86 N=22
	Tagmemics	39.38 N=24	31.95 N=20
	Probability	$<.002$	$<.44$
	Significance	yes	no

TABLE 4

Cell Means for Treatment x Conceptual Level x Anxiety

		CONCEPTUAL LEVEL		
		Low	Middle	High
TREATMENT	Free Writing	4.67 N=12	.36 N=22	.87 N=15
	Tagmemics	8.44 N=9	-2.29 N=24	2.91 N=11

NOTE: The higher the score reported, the lower the anxiety level.

TABLE 5

Cell Means for Treatment x I.Q. Anxiety

TREATMENT	I.Q. Middle	I.Q. High
Free Writing	1.28 N=36	2.39 N=13
Tagmemics	1.79 N=34	-.80 N=10

TABLE 6

Cell Means for Treatment x Ability Group x Anxiety

EDUCATIONAL PREFERENCE GROUP

TREATMENT	College-bound	vocational
Free Writing	2.89 N=27	-.05 N=22
Tagmemics	-1.38 N=24	4.30 N=20

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